

# **Application of a Hybrid Dynamical–Statistical Model for Week 3 to 4 Forecast of Atlantic/Pacific Tropical Storm and Hurricane Activities**

Jae-Kyung E. Schemm and Hui Wang

Climate Prediction Center, NCEP/NWS/NOAA

## **Abstract**

A hybrid dynamical–statistical system has been developed for forecasting week 1 to week 4 tropical cyclone activity based on multiple linear regressions. The empirical relationships have been established between observed tropical cyclone (TC) activity and large-scale atmospheric circulation predicted for weeks 1 – 4 from the CFSv2 hindcasts for tropical North Atlantic, tropical eastern North Pacific, and tropical western North Pacific basins, respectively. This is the basis for developing the hybrid dynamical–statistical forecasting system for weekly TC activity.

The forecast skill of the model has been evaluated based on cross-validations over the 1999–2014 period. The model has been run for each ocean basin with combinations of different predictors, including vertical wind shear, local and remote sea level pressure, and two MJO indices. Overall, the model has relatively high skills for the tropical western North Pacific and relatively low skills for the tropical eastern North Pacific. For different ocean basins, the highest forecast skill may be obtained using different predictors. In the western Pacific, for example, the model with one predictor, vertical wind shear (VWS), shows the highest skill for all lead times. In the eastern Pacific, using the remote sea level pressure (SLP2) leads to the highest skills for week 2 to 4 TC forecasts. Adding the two MJO indices as additional predictors does not improve the forecast skills. Because the MJO also affects the SLP and VWS fields, the MJO influence is likely represented by the SLP and VWS predictors.

It is planned to test the model for real-time forecasts during the 2016 hurricane season and implement the model into operations at NCEP/CPC starting from the 2017 hurricane season. The model test results based on the 1999–2014 seasons will be presented at the workshop.